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EXAMINER	
WANG, QUAN ZHEN	
ART UNIT	**PAPER NUMBER**
2633	

DATE MAILED: 01/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Applicati n N .	Applicant(s)
	10/077,525	CONRADI, JAN
	Examiner	Art Unit
	Quan-Zhen Wang	2633

-- The MAILING DATE of this communication appears on the cover sheet with th corresp ndence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 February 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4 and 7-20* is/are rejected.

7)☐ Claim(s) *3,5-6* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2/15/02, 4/15/02*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 7-11, 14-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Miyamoto et al. (U.S. Patent US 6,559,996 B1).

Regarding claim 7, Miyamoto teaches a method of converting a unipolar voltage data stream (fig. 3, INPUT NRZ ELECTRICAL SIGNAL) into a bipolar optical data stream (fig. 3, PHASE INVERTED OPTICAL RZ SIGNAL), the method comprising: supplying a continuous optical signal to a modulator (fig. 1, LIGHT SOURCE 5; column 10, lines 57-61), wherein the modulator has a maximum MARK optical power output at a first voltage driving level +V (fig. 4, FIRST LEVEL 1), a maximum MARK optical power output at a second voltage driving level –V (fig. 4, THIRD LEVEL –1), a minimum optical power output at a voltage level between the first and second voltage driving level (fig. 4, SECOND LEVEL 0) and the phase of every maximum MARK optical output pulse is inverted alternately (fig. 3, PHASE INVERTED OPTICAL RZ SIGNALS); encoding a unipolar voltage data stream (fig. 3, INPUT NRZ ELECTRICAL SIGNAL) to provide an

encoded bipolar voltage data stream (fig. 3, DIFFERENTIALTED SIGNAL); and driving the modulator with the encoded bipolar voltage data stream (fig. 1, DRIVE CIRCUIT) to generate a bipolar optical data stream such that there will be a minimum optical power output when the encoded bipolar voltage data stream stays at a midlevel between the first and the second voltage level (fig. 4).

Regarding claim 8, Miyamoto further teaches the encoding step comprising alternate MARK inversion encoding (fig. 3, PHASE INVERTED OPTICAL RZ SIGNALS).

Regarding claim 9, Miyamoto further teaches the encoding step comprises alternate MARK inversion (AMI) encoding and converting an NRZ unipolar signal (fig. 3, INPUT NRZ ELECTRICAL SIGNAL) to an RZ bipolar signal (fig. 3, DIFFERENTIATED SIGNAL).

Regarding claim 10, Miyamoto teaches unipolar electrical to bipolar optical converter (fig. 1), the converter comprising: a bipolar electrical coder (column 9, lines 44-46) for alternating the amplitude polarity of consecutive MARK pulses of a data encoded electrical signal to generate a bipolar data encoded electrical signal (fig. 3, DIFFERENTIALTED SIGNAL); and an electrical to optical modulator (fig. 1) having an optical input (fig. 1, input to OPTICAL INTENSITY MODULATOR form element 5) for receiving a continuous optical signal (fig. 1, LIGHT SOURCE 5), an electrical input (fig. 1, input to OPTICAL INTENSITY MODULATOR form DRIVE CIRCUIT) for receiving the bipolar data encoded electrical signal (fig. 3, DIFFERENTIALTED SIGNAL), and an optical output (fig. 1, the output from OPTICAL INTENSITY MODULATOR to OPTICAL

AMPLIFIER 6) for providing an AMI modulated optical signal (fig. 3, PHASE INVERTED OPTICAL RZ SIGNALS) having three optical electric field levels, +/-E and 0, and two optical power levels, 0 and P, when the bipolar data encoded electrical signal is applied to the electrical to optical modulator such that the resultant alternate electric fields of +/-E are in a form of phase shift keying (column 9, lines 23-67 and column 10, lines 1-30).

Regarding claim 11, Miyamoto further teaches the electrical to optical modulator (fig. 1) comprises an optical amplitude modulator and the modulator having the electrical input for receiving a bipolar NRZ (non-return-to-zero) data encoded electrical signal such that the modulator converts the bipolar NRZ electrical signal to a bipolar NRZ optical signal for optical transmission in an amplitude modulated form.

Regarding claim 14, Miyamoto further teaches the bipolar electrical coder comprises an RZ-AMI encoder for receiving a unipolar NRZ data encoded electrical signal and generating a bipolar RZ data encoded electrical signal in synchronism with a transmission bit rate clock signal (fig. 23, F: CLOCK OPTICAL PULSE and G: RZ OPTICAL MODULATED SIGNAL; column 13, lines 19-27).

Regarding claim 15, Miyamoto further teaches the electrical to optical modulator comprises a Mach-Zehnder interferometer (fig. 1; column 9, lines 37-40).

Regarding claim 16, Miyamoto further teaches that the optical converter comprising a laser for generating the continuous optical signal for use of the converter as a transmitter (fig. 1, LIGHT SOURCE 5).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyamoto et al. (U.S. Patent US 6,559,996 B1) in view of the instant Application.

Regarding claim 17-18, Miyamoto differs from the claimed invention in that Miyamoto does not specifically teach that the bipolar electrical coder comprises an NRZ-AMI encoder having a limited bandwidth for generating an NRZ unipolar data encoded electrical signal with finite rise and fall times to a bandlimited NRZ bipolar data encoded electrical signal at the electrical input of the electrical to optical modulator; wherein the electrical to optical modulator comprises a Mach-Zehnder interferometer for converting the NRZ bipolar data encoded electrical signal at the electrical input to an NRZ-AMI modulated optical signal comprising a pseudo RZ modulated optical signal in optical form at the optical output.

However, it is well known in the art that "because of band-limiting on the electrical signal by electrical circuits having a limited band with and the MZ modulator itself having limited bandwidth, the electrical signal edges will have finite rise and fall times" (page 8, paragraph 0030). Therefore, as it is admitted by the instant Application, "**practical implementation** of the NRZ-AMI encoder 24 of fig. 1 in electrical signal will **in fact** result in pseudo RZ-AMI in optical form" (page 8, paragraph 0030).

3. Claims 12-13, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyamoto et al. (U.S. Patent US 6,559,996 B1) in view of Graham (U.S. Patent US 6,028,540).

Regarding claims 12-13, Miyamoto differs from the claimed invention in that Miyamoto does not specifically teach that the bipolar electrical coder comprises an AMI encoder for receiving a unipolar NRZ or RZ data encoded electrical signal and generating a bipolar NRZ or RZ data encoded electrical signal in synchronism with a transmission bit rate clock signal. However, it was well known in the art at the time when the invention was made that a bipolar electrical coder can include an AMI encoder for receiving a unipolar NRZ or RZ data encoded electrical signal and generating a bipolar NRZ data encoded electrical signal in synchronism with a transmission bit rate clock signal. For example, Graham teaches an electrical encoder (fig. 2), which includes an AMI encoder for receiving a unipolar NRZ or RZ data encoded electrical signal and generating a bipolar NRZ or RZ data encoded electrical signal in synchronism with a transmission bit rate clock signal (figs. 1 and 2; column 3, lines 41-67 and column 4, lines 1-16). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate an AMI encoder for receiving a unipolar NRZ or RZ data encoded electrical signal and generating a bipolar NRZ or RZ data encoded electrical signal in synchronism with a transmission bit rate clock signal, as it is taught by Graham, in to the bipolar electrical coder of Miyamoto in order to generate electrical AMI waveform.

Regarding claim 19, Miyamoto differs from the claimed invention in that Miyamoto does not specifically teach that the bipolar electrical coder comprises an NRZ to RZ converter coupled to an AMI encoder. However, it was well known in the art at the time when the invention was made to convert an NRZ to RZ and couple the converter to an AMI encoder. For example, Graham teaches an electrical encoder (fig. 2), wherein an electrical NRZ data (fig. 2, data 201) to an electrical RZ data (fig. 2, data 203) converter (fig. 2, 200) is coupled to an AMI encoder (fig. 2; column 3, lines 66-67 and column 4, lines 1-16). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate an NRZ to RZ converter coupled to an AMI encoder, as it is taught by Graham, into the system taught by Miyamoto in order to generate RZ-AMI waveform from NRZ or RZ data.

Regarding claim 20, Graham further teaches the NRZ to RZ converter comprises a data rate clocked AND gate (fig.2)

4. Claims 1-2, and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vaziri et al. (U.S. Patent US 5,892,858) in view of Miyamoto et al. (U.S. Patent US 6,559,996 B1).

Regarding claim 1, Vaziri teaches an optical amplitude modulator (fig. 1, element 9) comprising: a first input (fig. 1, input 8) for receiving a continuous optical signal (fig. 1, CW optical carrier 14); and a second input (fig. 1, input to the Mach-Zehnder interferometer in element 9 from Driver 7) for receiving a bipolar data encoded electrical signal (fig. 1, signal 12); and a Mach-Zehnder modulator (fig. 1, Mach-Zehnder

interferometer in element 9) biased at V_{bias} at which the output optical is minimum, that reads on "biased at $V\pi$" of the claimed invention "which is the same as biasing at extinction" (Instant Application: page 6, paragraph 0023) for modulating the continuous signal based on the bipolar data encoded electrical signal for generating a modulated optical signal (fig. 3, optical signal on the right-hand side) having three electrical field levels, +/-E and 0, and two power levels, 0 and P, such that the resultant modulated signal is both amplitude and phase modulated (fig. 3, phase of 0 and π). Vaziri differs from the claimed invention in that Vaziri does not specifically teach that the modulated optical signal is an AMI modulated optical signal having three electrical field levels, +/-E and 0, and two power levels, 0 and P, such that the resultant modulated signal is both amplitude and phase modulated. However, it is well known in the art to use AMI modulated optical signal for communication systems. For example, Miyamoto teaches to apply bipolar data encoded electrical signal (fig. 3, Differentiated Signal) to a Mach-Zehnder modulator (fig. 1) to generate an AMI modulated optical signal (fig. 3; phase inverted optical signal). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply a bipolar data encoded electrical signal, such as the one taught by Miyamoto, for the data signal in the modulation system taught by Vaziri to generate an AMI modulated optical signal having three electrical field levels, +/-E and 0, and two power levels, 0 and P, such that the resultant modulated signal is both amplitude and phase modulated in order to provide an optical transmission system in which cross talk because of four wave mixing is substantially reduced.

Regarding claim 2, Miyamoto further teaches a bipolar electrical coder (fig. 2; column 9, lines 48-52) for alternating the amplitude polarity of consecutive MARK pulses of a data encoded electrical signal to generate the bipolar data encoded electrical signal (fig. 3; column 53-67 and column 10, lines 1-5) that is provided to the second input of the optical amplitude modulator.

Regarding claim 4, Miyamoto further teaches that the Mach-Zehnder modulator has a maximum MARK optical output pulse at a first voltage driving level +V (fig. 4, FIRST LEVEL +1), a maximum MARK optical output pulse at a second voltage driving level –V (fig. 4, THIRD LEVEL –1), a minimum optical output at a voltage level between the first and second voltage driving level (fig. 4, SECOND LEVEL 0) and the phase of every maximum MARK optical output pulse is inverted alternately (fig. 4, RZ OPTICAL SIGNAL, the phase is denoted by π and 0).

Allowable Subject Matter

5. Claims 3, 5-6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quan-Zhen Wang whose telephone number is (571) 272-3114. The examiner can normally be reached on 9:00 AM - 5:00 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

M. R. Sedighian

M. R. SEDIGHIAN
PRIMARY EXAMINER

qzw